



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,139	11/14/2003	Stephen M. Cea	42P16000	9935
8791	7590	06/22/2005	EXAMINER	
BLAKELY SOKOLOFF TAYLOR & ZAFMAN			LE, DUNG ANH	
12400 WILSHIRE BOULEVARD			ART UNIT	
SEVENTH FLOOR			PAPER NUMBER	
LOS ANGELES, CA 90025-1030			2818	

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No. 10/714,139	Applicant(s) CEA ET AL.	
	Examiner DUNG A. LE	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19,20 and 23-37 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 19,20 and 23-37 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

Dle

DETAILED ACTION

Claim Rejections

Set of claims 19- 30:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 19-26 and 28 are rejected under 35 USC 102 (e) as being anticipated by Currie et al. (2004/0026765 A1).

Currie et al. teach an apparatus 300B (fig. 4) comprising:

a substrate 460;

a strain-inducing layer 430 disposed on the substrate [0077], [0081] or [0083]; and

a strained layer 411 disposed on the strain-inducing layer 430. (also refer to fig. 1)

Regarding claim 20, further comprising:

a gate electrode 860 disposed on the strained layer 811 (fig. 8a-8d);

a first spacer 872 disposed adjacent to a first side of the gate electrode; and

a second spacer 872 disposed adjacent to a second side of the gate electrode

[0103].

Regarding claim 21, wherein the strain-inducing layer and the strained layer are disposed in a channel region beneath the gate electrode (figs 3,4, 7 and 8d).

Regarding claim 22, wherein the strain-inducing layer and the strained layer are disposed in a channel region beneath the gate electrode and the first and second spacers (figs 3,4, 7 and 8d) and [0105].

Regarding claim 23, wherein the apparatus comprises: an n-type metal oxide semiconductor 300B (fig. 4).

Regarding claim 24, wherein the strain-inducing layer 330/430 comprises: silicon germanium.

Regarding claim 25, wherein germanium comprises between approximately 20 and 25 percent of the silicon germanium (Table 1).

Regarding claim 28, wherein the apparatus comprises: a p-type metal oxide semiconductor 300A (fig. 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 26- 27 and 29- 30 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Currie et al. in view of the following remark.

Currie et al. disclose the thickness of the silicon germanium, but fail to disclose the silicon germanium layer has a thickness of between approximately 400 and 500 Å as cited in the present claim 26

However, it would have been obvious to one having ordinary skill in the art making semiconductor device to determine the workable or optimal range for the silicon germanium layer has a thickness of between approximately 400 and 500 Å through routine experimentation and optimization to optimal device performance.

Regarding claim 27, wherein the strained layer comprises silicon and has a thickness of between approximately 100 and 200 Å [0056].

Regarding claims 29- 30, Currie et al. discloses the claimed invention except for the strain-inducing layer comprises: silicon carbide as cited in current claim 29 and wherein carbon comprises between approximately 1 and 2 percent of the silicon carbide as cited in current claim 30.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the strain-inducing layer comprises: silicon carbide, because it is commonly used to prevent undesirable reactions in the contact region, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended application.

And, it would have been obvious to one having ordinary skill in the art making semiconductor device to determine the workable or optimal range for wherein carbon comprises between approximately 1 and 2 percent of the silicon carbide through routine experimentation and optimization to optimal device performance.

Set of claims 31- 37:

Claims 31- 35 are rejected under 35 USC 102 (e) as being anticipated by Currie et al. (2004/0026765 A1).

Currie et al. teach a system comprising: an integrated circuit package 300B (fig. 4) comprising:

- a substrate 460;
- a strain-inducing layer 430 disposed on the substrate [0077], [0081] or [0083]; and
- a strained layer 411 disposed on the strain-inducing layer 430. (also refer to fig. 1)

Regarding claim 32, wherein the system comprises: an n-type metal oxide semiconductor 300B (fig. 4).

Regarding claim 33, wherein the strain-inducing layer 430 comprises: silicon germanium.

Regarding claim 34, wherein germanium comprises between approximately 20 and 25 percent of the silicon germanium (table 1).

Regarding claim 35, wherein the system comprises: a p-type metal oxide semiconductor 300A (fig. 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 36- 37 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Currie et al. in view of the following remark.

Regarding claims 36- 37, Currie et al. discloses the claimed invention except for the strain-inducing layer comprises: silicon carbide as cited in current claim 36 and wherein carbon comprises between approximately 1 and 2 percent of the silicon carbide as cited in current claim 37.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the strain-inducing layer comprises: silicon carbide, because it is commonly used to prevent undesirable reactions in the contact region, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended application.

And, it would have been obvious to one having ordinary skill in the art making semiconductor device to determine the workable or optimal range for wherein carbon

comprises between approximately 1 and 2 percent of the silicon carbide through routine experimentation and optimization to optimal device performance.

Response to Amendment.

For set of original claims 19-30, Applicants amended independent claim 19, cancelled claims 21- 22. For set of original claims 31-37, Applicants amended independent claim 31. Therefore Sets of claims 19-20, 23-30 and 31-37 are pending.

Applicants' argument filed 6/31/2005 have been fully considered but they are not deemed to be persuasive.

Applicants argue that **Independent claim 19** is not anticipated by Currie, because Currie does not disclose an apparatus comprising a substrate, a strain-inducing layer, and a strained layer, wherein the strain inducing layer and the strained layer are disposed in a channel region for a transistor device and a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode on the substrate. One way the apparatus may achieve the strain layer is from lateral contraction or expansion is by defining junction regions by removing a portion of the strained layer and possibly a portion of strain-inducing layer that may be formed in areas designated for junction regions using a gate electrode or a gate electrode with lateral spacers as an edge, and then introducing material for the junction region. With reference to Figures 1-3, Currie describes a strain-inducing layer, a tensilely strained

layer, and a compressively strained layer. With reference to Figure 3, Currie describes forming the source and drain contacts 340 by depositing a metal layer and reacting the metal layer with the channel layer and the relaxed S]Ge layer 360. See col. 6, paragraph 0073, final sentence. Thus, it does not appear that Currie provides any opportunity to its strain-inducing layer to allow lateral contraction or expansion following introduction of a gate electrode.

Claims 20, 23-26 and 28 depend from claim 19 and therefore contain all the limitations of that claim. For at least the reasons stated with respect to claim 19, claims 20, 23-26 and 28 are not anticipated by Currie.

And **Independent claim 31** relates to a system comprising an integrated circuit package including a substrate, a strain-inducing layer disposed on the substrate, and a strained layer disposed on the strain-inducing layer, wherein the strain-inducing layer and the strained layer are disposed in a channel region for a transistor device and a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode on the substrate. Independent claim 31 is not anticipated by Currie, because Currie does not disclose a strain in the strained layer resulting from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode of the substrate. The discussion of Currie with respect to claim 19 is applicable to claim 31. Claims 34-35 depend from claim 31 and therefore

contain all the limitations of that claim. For at least the reasons stated with respect to claim 31, claims 34-35 are not anticipated by Currie.

The Patent Office rejects claims 26-27, 29-30 and 36-37 under 35 U.S.C. §103(a) as obvious over Currie. Claims 26-27 and 29-30 depend from claim 1 and therefore contain all the limitations of that claim. Claims 36-37 depend from claim 31 and therefore contain all the limitations of that claim. For at least the reasons stated above with respect to their independent claims, claims 26-27, 29-30 and 36-37 are prima facie not obvious over Currie. Further, Currie does not provide any motivation for, for example, a strained layer resulting from lateral contraction or expansion of a strain-inducing layer. For the above stated reasons, Applicants respectfully request that the Patent Office withdraw the rejection to claims 26-27, 29-30 and 36-37 under 35 U.S.C. § 103(a).

Claim Rejections

Set of claims 19- 20 and 23-30.

Claims 19- 20 and 23-30 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Currie et al. in view of the following remark.

Contrary to applicants' argument Currie et al. teach an apparatus 300B (fig. 4) comprising: a substrate 460; a strain-inducing layer 430 disposed on the substrate [0077],

[0081] or [0083]; and a strained layer 411 disposed on the strain-inducing layer 430. (also refer to fig. 1), wherein the strain inducing layer 430 and the strained layer 411 are disposed in a channel region for a transistor device 300B, except for a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode on the substrate.

Currie et al. do not disclose “a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode on the substrate “ in claim 19. However, the limitation “a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode on the substrate “ is taken to be a product by process limitation and consider non-limitation. In a product-by-process claim, it is the patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by-process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ I S at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it

clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

Set of claims 31- 37.

Claims 31- 37 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Currie et al. in view of the following remark.

Contrary to applicants' argument, Currie et al. teach a system comprising: an integrated circuit package 300B (fig. 4) comprising: a substrate 460; a strain-inducing layer 430 disposed on the substrate [0077], [0081] or [0083]; and a strained layer 411 disposed on the strain-inducing layer 430. (also refer to fig. 1), wherein the strain inducing layer 430 and the strained layer 411 are disposed in a channel region for a transistor device 300B, except for a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode on the substrate.

Currie et al. do not disclose "a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following formation of a gate electrode on the substrate " in claim 31. However, the limitation "a strain in the strained layer results from lateral contraction or expansion of the strain-inducing layer following

formation of a gate electrode on the substrate " is taken to be a product by process limitation and consider non-limitation. In a product-by-process claim, it is the patentability of the claimed product and not of the recited process steps which must be established. Therefore, when the prior art discloses a product which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. The Patent Office is not equipped to manufacture products by a myriad of processes put before it and then obtain prior art product and make physical comparisons therewith. In re Brown, 173 USPQ 685 (CCPA 1972). Also, a product by process claim directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ I S at 17 (footnote 3). See In re Fessman, 180 USPQ 324, 326 (CCPA 1974); In re Marosi et al., 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a " product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung A. Le whose telephone number is (571) 272-1784. The examiner can normally be reached on Monday-Friday 8:00am- 4:30pm.

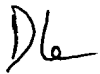
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For

Application/Control Number: 10/714,139
Art Unit: 2818

Page 15

more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DUNG A. LE 
Primary Examiner
Art Unit 2818